

1   **WHAT IS CLAIMED IS:**

2           1. A bidirectional pneumatic impact wrench comprising:

3           a housing comprising

4                 a motor casing having a front, a rear, a bottom, a motor chamber

5     defined longitudinally through the motor casing, a forward air passage and

6     reverse air passage symmetrically defined in the motor casing at the rear, a valve

7     chamber defined in the rear under the motor chamber and a motor-air discharge

8     port communicating between the motor chamber and the valve chamber; and

9                 a handle integrally extending from the bottom of the motor

10    casing and having a compressed air passage with an inner opening

11    communicating with the valve chamber, an exhaust air passage with an inner

12    opening communicating with the valve chamber and an air supply valve

13    mounted in the compressed air passage to control compressed air to the valve

14    chamber;

15                 a front assembly attached to the front of the motor casing;

16                 a hammer assembly mounted in the motor chamber and connected to the

17    front assembly;

18                 a pneumatic motor mounted in the motor chamber, connected to the

19    hammer assembly to drive the hammer assembly and having a rear, a reverse air

20    inlet and forward air inlet defined in the rear and an air outlet communicating

21    with the motor chamber;

22                 a rear assembly attached to the rear of the motor casing and comprising

23                         a rear cover attached to the rear of the motor casing to cover the

24    motor chamber and having an inner side, an outer side, a forward air passage and

1 reverse air passage symmetrically defined in the inner side of the rear cover and a  
2 control valve hole defined through the outer side of the rear cover and aligned  
3 with the valve chamber in the motor casing, where the forward air passage in the  
4 rear cover communicates with the forward air passage in the motor housing to  
5 the forward air inlet of the pneumatic motor, and the reverse air passage in the  
6 rear cover communicates with the reverse air passage in the motor housing to the  
7 reverse air inlet of the pneumatic motor; and

8 a gasket mounted between the rear of the motor casing and the  
9 rear cover; and

10 an air control valve mounted at the outer side of the rear cover and  
11 comprising

12 a rotatable shaft rotatably held in the control valve hole and the  
13 valve chamber and having an inside end inserted into the control valve hole and  
14 extending into the valve chamber, an outside end, an exterior surface, a spiral  
15 forward air groove and reverse air groove symmetrically defined in the exterior  
16 surface to direct the compressed air coming from the inner opening of the  
17 compressed air passage to selectively enter the forward air passage and the  
18 reverse air passage and an annular slot defined in the exterior surface adjacent to  
19 the inside end between the openings of the compressed air passage and the  
20 exhaust air passage;

21 a knob attached to the outside end of the shaft to turn the shaft;

22 a positioning device mounted in the knob to hold the knob in  
23 place; and

24 an O-ring mounted in the annular slot to keep the compressed air

1 from directly being exhausted through the exhaust air passage.

2 2. The bidirectional pneumatic impact wrench as claimed in claim 1,

3 wherein

4 the forward air passage in the motor housing has an outlet defined in the  
5 rear of the motor casing and communicating with the forward air passage in the  
6 rear cover, and an inlet communicating with the valve chamber; and

7 the reverse air passage in the motor casing has an outlet defined in the rear  
8 of the motor casing and communicating with the reverse air passage in the rear  
9 cover, and an inlet communicating with the valve chamber.

10 3. The bidirectional pneumatic impact wrench as claimed in claim 2,

11 wherein the shaft further comprises an axial hole defined in the inside end of the  
12 shaft and communicating with the valve chamber, and a tangential slot defined in  
13 the exterior surface at a position that corresponds to the inlet of the forward air  
14 passage in the motor housing when the reverse air groove is aligned with the inlet  
15 of the reverse air passage in the motor housing and the inlet of the reverse air  
16 passage in the motor housing when the forward air groove is aligned with the  
17 inlet of the forward air passage in the motor housing.

18 4. The bidirectional pneumatic impact wrench as claimed in claim 1,

19 wherein

20 the rear cover further has a countersunk hole defined in the outer side of  
21 the rear cover, aligned with the valve chamber in the motor casing and having a  
22 bottom with multiple detents, where the control valve hole is defined through the  
23 bottom of the countersunk hole and the detents are arranged in a curved line  
24 above the control valve hole;

1 the knob has an inner side rotatably abutting the bottom of the  
2 countersunk hole and a spring hole defined in the inner side of the knob and  
3 selectively aligned with the detents; and

4 the positioning device is mounted in the spring hole and comprises a  
5 spring mounted in the spring hole and a ball partially held in the spring hole  
6 against the spring and engaging one of the detents.

7 5. The bidirectional pneumatic impact wrench as claimed in claim 3,  
8 wherein

9 the rear cover further has a countersunk hole defined in the outer side of  
10 the rear cover, aligned with the valve chamber in the motor casing and having a  
11 bottom with multiple detents, where the control valve hole is defined through the  
12 bottom of the countersunk hole and the detents are arranged in a curved line  
13 above the control valve hole;

14 the knob has an inner side rotatably abutting the bottom of the  
15 countersunk hole and a spring hole defined in the inner side of the knob and  
16 selectively aligned with the detents; and

17 the positioning device is mounted in the spring hole and comprises a  
18 spring mounted in the spring hole and a ball partially held in the spring hole  
19 against the spring and engaging one of the detents.

20 6. The bidirectional pneumatic impact wrench as claimed in claim 5,  
21 wherein the shaft further has two annular slots defined in the exterior surface  
22 adjacent to the outside end of the shaft to receive respectively two O-rings.

23 7. The bidirectional pneumatic impact wrench as claimed in claim 6,  
24 wherein

1           the forward air passage in the rear cover has a curved upper segment  
2 aligned and communicating with the forward air inlet in the pneumatic motor  
3 and a vertical lower segment communicating with the outlet of the forward air  
4 passage in the motor housing; and

5           the reverse air passage in the rear cover has a curved upper segment  
6 aligned and communicating with the reverse air inlet in the pneumatic motor and  
7 a vertical lower segment communicating with the outlet of the reverse air  
8 passage in the motor housing.

9           8. The bidirectional pneumatic impact wrench as claimed in claim 1,  
10 wherein the air outlet in the pneumatic motor comprises two through holes.

11          9. The bidirectional pneumatic impact wrench as claimed in claim 7,  
12 wherein the air outlet in the pneumatic motor comprises two through holes.

13          10. The bidirectional pneumatic impact wrench as claimed in claim 9,  
14 wherein the knob is eccentrically attached to the outside end of the shaft to form  
15 an eccentric section where the spring hole is defined in the eccentric section.